

# MA Series

## Magnetically Actuated Safety Interlock Switches

- Large selection—choose from a large selection of contact configurations housed in plastic to satisfy most application requirements
- NEMA 6 enclosure enables the MA Series switches to satisfy most application requirements (MA 3, 4, 5 are NEMA 4)
- Misalignment tolerant—the non-contact actuation of the switches makes them very tolerant to misalignment of up to 10 mm (0.39 in.)
- Variety of terminations—select various cable lengths or terminal strip termination for easy installation. Cable connector on selected models.
- Long life—the MA Series is designed for a minimum of one million actuations
- A Rapid Delivery Product: Select models are available for shipment today or within 3 to 5 days



Conforms to EN1088, EN292, EN60204-1  
UL and C-UL listed

## Specifications

| Electrical                         | All Models Unless Indicated                                  |                                                             |
|------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------|
| Safety Contacts:                   | AC models                                                    | MA-1 thru 5, 10, 12, 13, 16 — 1 N/C                         |
|                                    | DC models                                                    | MA-12, 13, 14, 16 — 1 N/C                                   |
| Safety Contact Operating Distance: | Make 7-12 mm (0.28-0.47 in.); Break 12-25 mm (0.47-0.98 in.) |                                                             |
| Auxiliary Contacts:                | MA-2, 4, 12, 13, 14, 15, 16, 21                              | 1 N/O                                                       |
|                                    | MA-3                                                         | 1 N/C                                                       |
| Aux. Contact Operating Distance:   | MA-2, 4, 16, 21                                              | Make 8-13 mm (0.39-0.51 in.); Break 8-10 mm (0.31-0.39 in.) |
|                                    | MA-3                                                         | Make 21 mm (0.83 in.); Break 24 mm (0.94 in.)               |
| Safety Rated Voltage:              | AC models: All except MA-10                                  | 230 VAC                                                     |
|                                    | AC models: MA-10                                             | 110 VAC                                                     |
|                                    | DC models                                                    | 30 VDC                                                      |
| Safety Rated Current:              | AC models: All except MA-3                                   | 2 A, fuse externally 1.6 A quick acting                     |
|                                    | AC model: MA-3                                               | 3 A, fuse externally 2.5 A quick acting                     |
|                                    | DC models: All except MA-15                                  | 1 A, fuse externally 800 mA quick acting                    |
|                                    | DC model: MA-15                                              | 0.3 A max., fuse externally 0.2 A quick acting              |
| Internal Fuse:                     | AC models                                                    | 2 A fast acting                                             |
|                                    | DC models                                                    | 1 A fast acting                                             |
| External Fuse (Customer Supplied): | AC models                                                    | 1.6 A fast acting                                           |
|                                    | DC models: All except MA-15                                  | 0.8 A fast acting                                           |
| Electrical Life:                   | 1 x 10 <sup>6</sup>                                          |                                                             |
| Mechanical—Special Safety Reed     | <b>Safety</b>                                                | <b>Aux.</b>                                                 |
| Closing Time:                      | 3.0 mS                                                       | 0.5 mS                                                      |
| Drop-Out Time:                     | 2.1 mS                                                       | 0.3 mS                                                      |
| Bounce Time:                       | 0.7 mS                                                       | 0.7 mS                                                      |
| Shock:                             | 10 G                                                         | 10 G                                                        |
| Vibration:                         | 10 G, 50 to 100 Hz                                           |                                                             |
| <b>Mechanical</b>                  |                                                              |                                                             |
| Mounting:                          | Any position                                                 |                                                             |
| Case & Actuator Material:          | Molded ABS                                                   |                                                             |
| Wiring Connection:                 | Various lengths or male M12 micro connector                  |                                                             |
| Weight:                            | Approx. 384 g (14 oz.)                                       |                                                             |
| Color:                             | Red                                                          |                                                             |
| Mechanical Life:                   | 10 x 10 <sup>6</sup>                                         |                                                             |
| <b>Environmental</b>               |                                                              |                                                             |
| Protection:                        | All models except MA-3, 4, 5                                 | IP67 (NEMA 6)                                               |
|                                    | MA-3, 4, 5                                                   | IP65 (NEMA 4)                                               |
| Operating Temperature:             | All models except MA-3, 4, 5                                 | -10 to 55°C (14 to 131°F)                                   |
|                                    | MA-3, 4, 5                                                   | -10 to 65°C (14 to 149°F)                                   |
| <b>Compliance</b>                  |                                                              |                                                             |
| Standards:                         | EN1088, EN292, EN60204-1                                     |                                                             |
| Approvals/Listings:                | CE marked for all applicable directives                      |                                                             |
|                                    | All models: except MA-3, 4, 5                                | UL and C-UL                                                 |
|                                    | MA-3, 4, 5                                                   | cCSAus                                                      |

Specifications are subject to change without notice. Note: The safety contacts of the STI switches are described as normally closed (N/C) i.e., with the guard closed, actuator in place, and the machine able to be started.

## Basic Body Styles

MA-1, MA-2, MA-20 and MA-21



MA-10 and MA-16



MA-12 and MA-13



MA-14 and MA-15

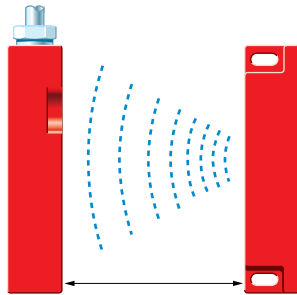


MA-3, MA-4 and MA-5



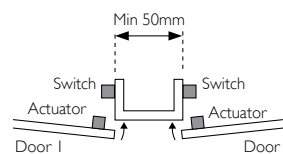
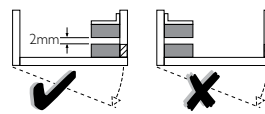
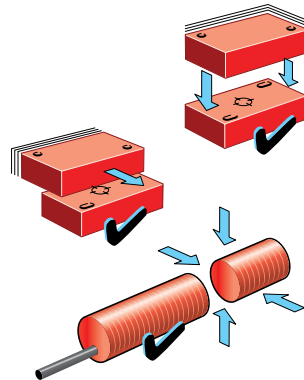
## Operation

### Operating Principle



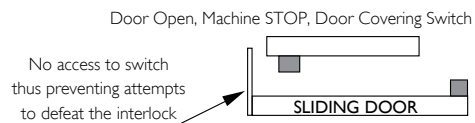
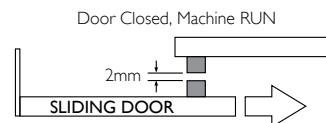
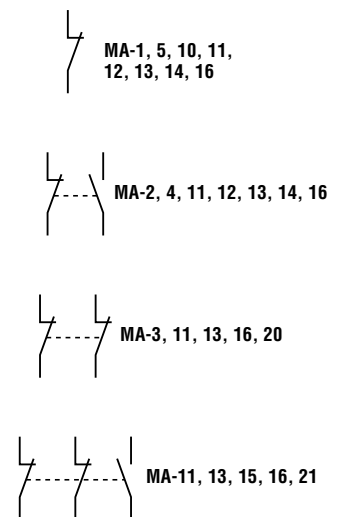
Encapsulated in the MA Series is a unique high-power industrial reed which is de-rated by a non-resettable overload protection circuit depending on switch type. On presenting the actuator to the switch, the high intensity magnetic field from the actuator causes the contacts to close. On removing the actuator (opening the door), the safety contacts open, isolating the machine.

### Mounting Examples



It is advisable, where possible, to mount the switch and actuator on non-ferrous materials otherwise it may affect the operating distances.

### Contact Arrangement



Wherever possible the units should be mounted so that no access can be obtained to the switch when the guard door is open, thus preventing attempts to defeat the safety system.

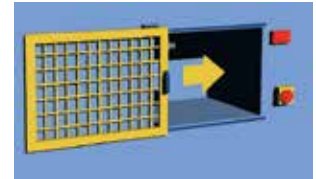
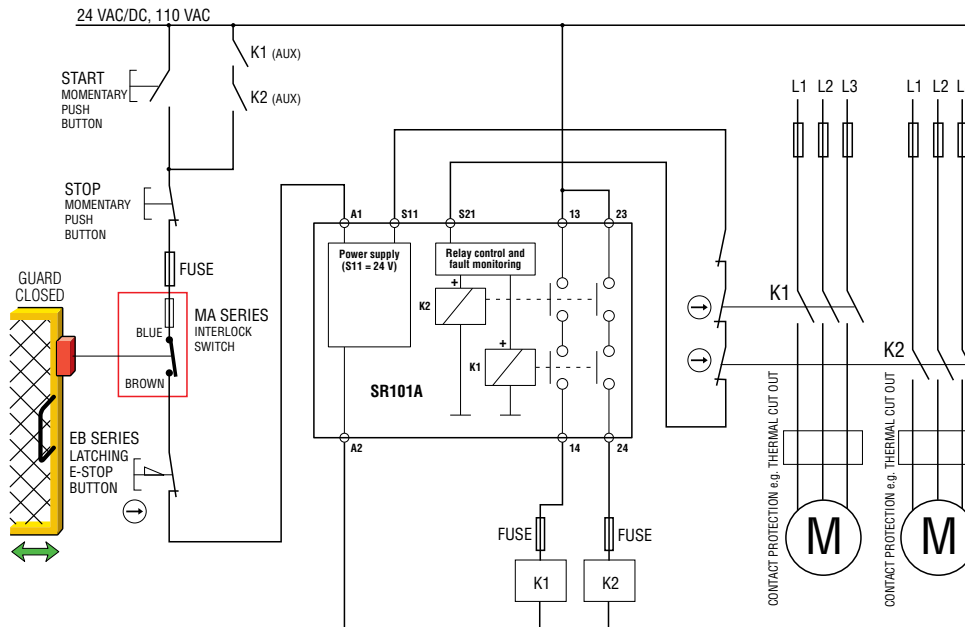
Select models are available for Rapid Delivery.

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## Applications

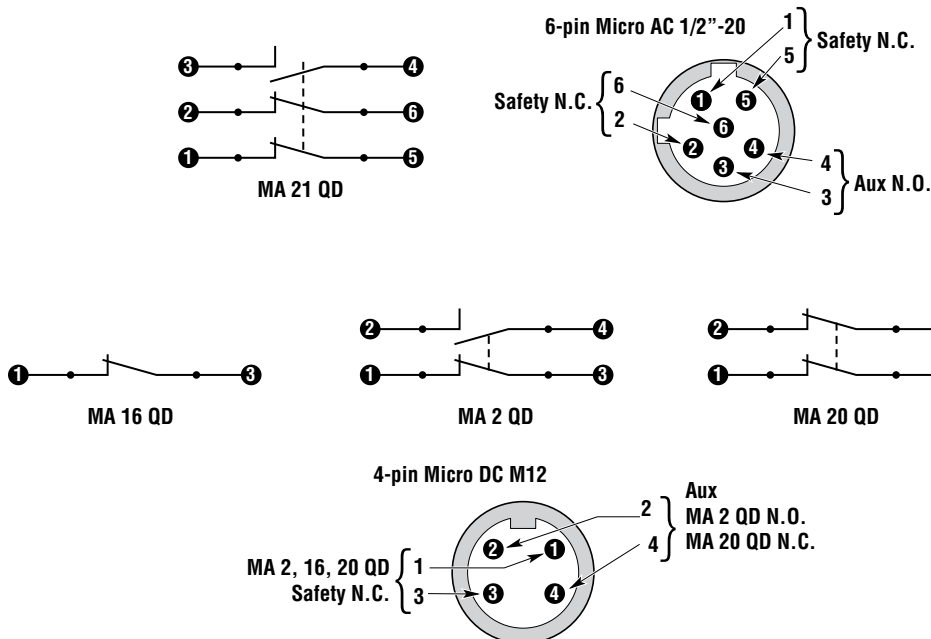
### Typical Application of MA Series with a Safety Monitoring Relay

Typical applications are on sliding guard doors or swinging guard doors.



For a full explanation of the circuit operating principle and fault detection, see "Common Circuit Examples" in the Expert Area Section of this catalog on page A-31

### Pin Assignments with Connector Option



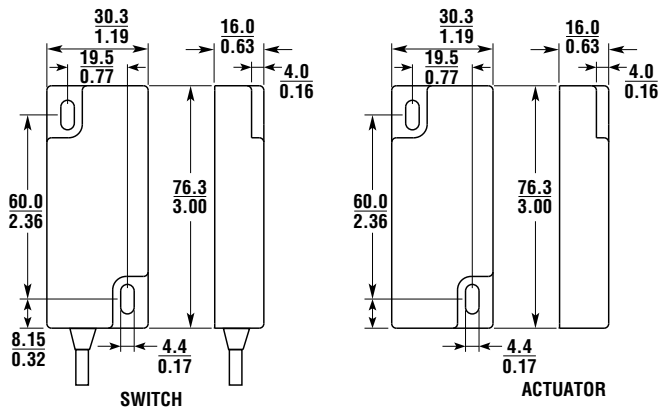
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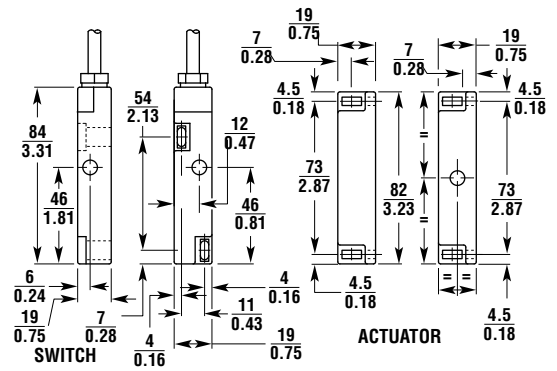
# Dimensions

(mm/in.)

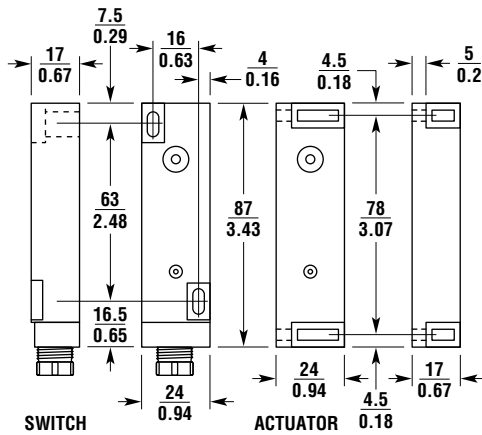
MA-1, 2, 20, 21



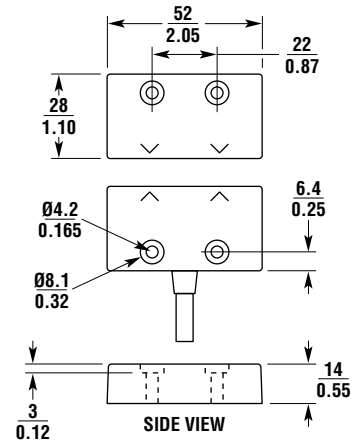
MA-10



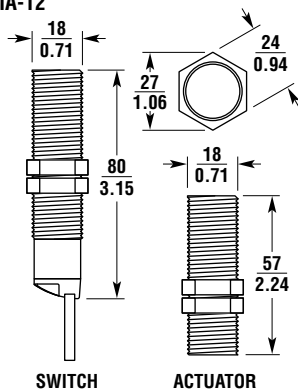
MA-11



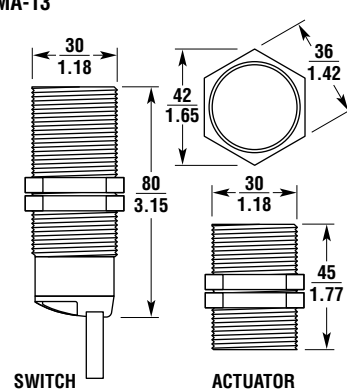
MA-14, 15



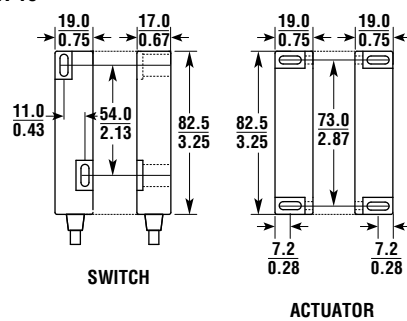
MA-12



MA-13



MA-16



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## Ordering

| Model                       | Contacts      | Wiring Entry          | Part No.   |
|-----------------------------|---------------|-----------------------|------------|
| <b>AC Only</b>              |               |                       |            |
| MA-1APC2 (AC only)          | 1 N/C         | 2 m cable, pre-wired  | 44507-0010 |
| MA-1APC4 (AC only)          | 1 N/C         | 4 m cable, pre-wired  | 44507-0020 |
| MA-1APC8 (AC only)          | 1 N/C         | 8 m cable, pre-wired  | 44507-0180 |
| MA-1APCC (AC only)          | 1 N/C         | 4 pin micro DC M12    | 44507-0619 |
| MA-2APC2 (AC only)          | 1 N/C + 1 N/O | 2 m cable, pre-wired  | 44507-0030 |
| MA-2APC4 (AC only)          | 1 N/C + 1 N/O | 4 m cable, pre-wired  | 44507-0040 |
| MA-2APC6 (AC only)          | 1 N/C + 1 N/O | 6 m cable, pre-wired  | 44507-0150 |
| MA-2APC10 (AC only)         | 1 N/C + 1 N/O | 10 m cable, pre-wired | 44507-0750 |
| MA-2APC15 (AC only)         | 1 N/C + 1 N/O | 15 m cable, pre-wired | 44507-0740 |
| MA-2APCC (AC only)          | 1 N/C + 1 N/O | 4-pin micro DC M12    | 44507-0600 |
| MA-3APTC (AC only)          | 1 N/C + 1 N/C | Terminal connections  | 44507-0050 |
| MA-4APTC (AC only)          | 1 N/C + 1 N/O | Terminal connections  | 44507-0060 |
| MA-5APTC (AC only)          | 1 N/C         | Terminal connections  | 44507-0070 |
| MA-10APC2 (110 VAC, 3A max) | 1 N/C         | 2 m cable, pre-wired  | 44507-0110 |
| MA-10APC4 (110 VAC, 3A max) | 1 N/C         | 4 m cable, pre-wired  | 44507-0330 |
| MA-11AP10C3                 | 1 N/C         | 3 m cable, pre-wired  | 44507-1150 |
| MA-11AP11C3                 | 1 N/C + 1 N/O | 3 m cable, pre-wired  | 44507-1160 |
| MA-11AP11C10                | 1 N/C + 1 N/O | 10 m cable, pre-wired | 44507-1161 |
| MA-11AP20C3                 | 2 N/C         | 3 m cable, pre-wired  | 44507-1170 |
| MA-11AP21C3                 | 2 N/C + 1 N/O | 3 m cable, pre-wired  | 44507-1180 |
| MA-12AP10C3                 | 1 N/C         | 3 m cable, pre-wired  | 44507-1250 |
| MA-12AP11C3                 | 1 N/C + 1 N/O | 3 m cable, pre-wired  | 44507-1260 |
| MA-13AP10C3                 | 1 N/C         | 3 m cable, pre-wired  | 44507-1350 |
| MA-13AP11C3                 | 1 N/C + 1 N/O | 3 m cable, pre-wired  | 44507-1360 |
| MA-13AP20C3                 | 2 N/C         | 3 m cable, pre-wired  | 44507-1370 |
| MA-13AP21C3                 | 2 N/C + 1 N/O | 3 m cable, pre-wired  | 44507-1380 |
| MA-16AP10C3 (AC only)       | 1 N/C         | 3 m cable, pre-wired  | 44507-1650 |
| MA-16AP10C6 (AC only)       | 1 N/C         | 6 m cable, pre-wired  | 44507-1651 |
| MA-16AP10C10 (AC only)      | 1 N/C         | 10 m cable, pre-wired | 44507-1659 |
| MA-16AP10CC                 | 1 N/C         | 4-pin micro DC M12    | 44507-1652 |
| MA-16AP11C3 (AC only)       | 1 N/C + 1 N/O | 3 m cable, pre-wired  | 44507-1660 |
| MA-16AP11C6 (AC only)       | 1 N/C + 1 N/O | 6 m cable, pre-wired  | 44507-1661 |
| MA-16AP20C3 (AC only)       | 2 N/C         | 3 m cable, pre-wired  | 44507-1670 |
| MA-16AP20C6 (AC only)       | 2 N/C         | 6 m cable, pre-wired  | 44507-1671 |
| MA-16AP21C3 (AC only)       | 2 N/C + 1 N/O | 3 m cable, pre-wired  | 44507-1680 |
| MA-16AP21C6 (AC only)       | 2 N/C + 1 N/O | 6 m cable, pre-wired  | 44507-1681 |
| MA-20APC4 (AC only)         | 2 N/C         | 4 m cable, pre-wired  | 44507-0345 |
| MA-20APCC (AC only)         | 2 N/C         | 4-pin micro DC M12    | 44507-0640 |
| MA-21APC2 (AC only)         | 2 N/C + 1 N/O | 2 m cable, pre-wired  | 44507-0160 |
| MA-21APC4 (AC only)         | 2 N/C + 1 N/O | 4 m cable, pre-wired  | 44507-0260 |
| MA-21APC6 (AC only)         | 2 N/C + 1 N/O | 6 m cable, pre-wired  | 44507-0250 |
| MA-21APC10 (AC only)        | 2 N/C + 1 N/O | 10 m cable, pre-wired | 44507-0170 |
| MA-21APC15                  | 2 N/C + 1 N/O | 15 m cable, pre-wired | 44507-0175 |
| MA-21APCC                   | 2 N/C + 1 N/O | 6-pin micro DC M12    | 44507-0660 |

(Continued on next page)



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# Ordering (continued)

| Model                                               | Contacts      | Wiring Entry                       | Part No.   |
|-----------------------------------------------------|---------------|------------------------------------|------------|
| <b>DC Only</b>                                      |               |                                    |            |
| MA-1DPC2                                            | 1 N/C         | 2 m cable, pre-wired               | 44507-0022 |
| MA-1DPC4                                            | 1 N/C         | 4 m cable, pre-wired               | 44507-0024 |
| MA-1DPC8                                            | 1 N/C         | 8 m cable, pre-wired               | 44507-0028 |
| MA-1DPCC                                            | 1 N/C         | 4p-pin micro DC M12                | 44507-0629 |
| MA-2DPC2                                            | 1 N/C + 1 N/O | 2 m cable, pre-wired               | 44507-0392 |
| MA-2DPC4                                            | 1 N/C + 1 N/O | 4 m cable, pre-wired               | 44507-0390 |
| MA-2DPC6                                            | 1 N/C + 1 N/O | 6 m cable, pre-wired               | 44507-0396 |
| MA-2DPC10                                           | 1 N/C + 1 N/O | 10 m cable, pre-wired              | 44507-0380 |
| MA-2DPC15                                           | 1 N/C + 1 N/O | 15 m cable, pre-wired              | 44507-0370 |
| MA-2DPCC                                            | 1 N/C + 1 N/O | 4-pin micro DC M12                 | 44507-0650 |
| MA-11DP10C3                                         | 1 N/C         | 3 m cable, pre-wired               | 44507-1110 |
| MA-11DP11C3                                         | 1 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1120 |
| MA-11DP20C3                                         | 2 N/C         | 5 m cable, pre-wired               | 44507-1130 |
| MA-11DP20C5                                         | 2 N/C         | 3 m cable, pre-wired               | 44507-1131 |
| MA-11DP21C3                                         | 2 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1140 |
| MA-12DP10C3                                         | 1 N/C         | 3 m cable, pre-wired               | 44507-1210 |
| MA-12DP11C3                                         | 1 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1220 |
| MA-13DP10C3                                         | 1 N/C         | 3 m cable, pre-wired               | 44507-1310 |
| MA-13DP11C3                                         | 1 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1320 |
| MA-13DP20C3                                         | 2 N/C         | 3 m cable, pre-wired               | 44507-1330 |
| MA-13DP21C3                                         | 2 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1340 |
| MA-13DP21C10                                        | 2 N/C + 1 N/O | 10 m cable, pre-wired              | 44507-1341 |
| MA-14DP10C3                                         | 1 N/C         | 3 m cable, pre-wired               | 44507-1410 |
| MA-14DP11C3                                         | 1 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1420 |
| MA-15DP21C3*                                        | 2 N/C + 1 N/O | 3 m cable, pre-wired (300 mA max.) | 44507-1540 |
| MA-15DP21C5*                                        | 2 N/C + 1 N/O | 5 m cable, pre-wired (300 mA max.) | 44507-1541 |
| MA-15DP21CC*                                        | 2 N/C + 1 N/O | 6-pin micro DC M12                 | 44507-1549 |
| MA-16DP10C3 (DC only)                               | 1 N/C         | 3 m cable, pre-wired               | 44507-1610 |
| MA-16DP10C6 (DC only)                               | 1 N/C         | 6 m cable, pre-wired               | 44507-1611 |
| MA-16DP10C10 (DC only)                              | 1 N/C         | 10 m cable, pre-wired              | 44507-1612 |
| MA-16DP10CC (DC only)                               | 1 N/C         | 4-pin micro DC M12                 | 44507-1619 |
| MA-16DP11C3 (DC only)                               | 1 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1620 |
| MA-16DP11C6 (DC only)                               | 1 N/C + 1 N/O | 6 m cable, pre-wired               | 44507-1621 |
| MA-16DP20C3 (DC only)                               | 2 N/C         | 3 m cable, pre-wired               | 44507-1630 |
| MA-16DP20C6 (DC only)                               | 2 N/C         | 6 m cable, pre-wired               | 44507-1631 |
| MA-16DP21C3 (DC only)                               | 2 N/C + 1 N/O | 3 m cable, pre-wired               | 44507-1640 |
| MA-16DP21C6 (DC only)                               | 2 N/C + 1 N/O | 6 m cable, pre-wired               | 44507-1641 |
| MA-20DPC4 (24 VDC only)                             | 2 N/C         | 4 m cable, pre-wired               | 44507-0340 |
| MA-20DPCC (24 VDC only)                             | 2 N/C         | 4-pin micro DC M12                 | 44507-0630 |
| MA-21DPC2 (24 VDC only)                             | 2 N/C + 1 N/O | 2 m cable, pre-wired               | 44507-0270 |
| MA-21DPC4 (24 VDC only)                             | 2 N/C + 1 N/O | 4 m cable, pre-wired               | 44507-0280 |
| MA-21DPC6 (24 VDC only)                             | 2 N/C + 1 N/O | 6 m cable, pre-wired               | 44507-0290 |
| MA-21DPC10 (24 VDC only)                            | 2 N/C + 1 N/O | 10 m cable, pre-wired              | 44507-0350 |
| MA-21DPC15 (24 VDC only)                            | 2 N/C + 1 N/O | 15 m cable, pre-wired              | 44507-0360 |
| MA-21DPCC                                           | 2 N/C + 1 N/O | 6-pin micro DC M12                 | 44507-0670 |
| <b>Accessories</b>                                  |               |                                    |            |
| Spare Actuator (1-5 & 20, 21), Red ABS Plastic      |               |                                    | 44507-0700 |
| Replacement Actuator for MA-11, Red ABS Plastic     |               |                                    | 44507-0711 |
| Replacement Actuator for MA-12, Red ABS Plastic     |               |                                    | 44507-0712 |
| Replacement Actuator for MA-13, Red ABS Plastic     |               |                                    | 44507-0713 |
| Replacement Actuator for MA-14, Red ABS Plastic     |               |                                    | 44507-0714 |
| Replacement Actuator for MA-15, Red ABS Plastic     |               |                                    | 44507-0715 |
| Replacement Actuator for MA-16, -10 Red ABS Plastic |               |                                    | 44507-0716 |

\*MA-15 switches are not compatible with the following STI safety relays: SR203M, SR203AM, SR208AD, SR209AD and all Legacy Relays.



Universal Mounting Brackets can be used with this product. See page G-210 for details.



Select models are available for Rapid Delivery.

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# Terms and Conditions of Sale

1. **Offer; Acceptance.** These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
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3. **Discounts.** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. **Interest.** Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. **Orders.** Omron will accept no order less than \$200 net billing.
6. **Governmental Approvals.** Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. **Taxes.** All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. **Force Majeure.** Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Omron:
  - a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
  - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
  - c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
  - d. Delivery and shipping dates are estimates only; and
  - e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. **Claims.** Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
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